

Effect of Farm Yard Manure and Thiourea on Growth and Yield of Cluster bean[*Cyamopsis tetragonoloba*(L.) Taub.]

A B S T R A C T

The experiment comprising four treatments of FYM (control, 10:15:20 t FYM /ha) and four treatments of Thiourea (control, Thiourea @ 500:750:1000 ppm) thus, making sixteen treatment combinations were tested in randomized block design with three replications at Horticulture Farm, S.K.N. College of Agriculture, Jobner (Jaipur) during *Kharif* 2020-21. The study revealed that the application of FYM @ 20 t/ha along with thiourea @ 1000 ppm significantly increased the plant height (136.82 cm 60 DAS), number of branches (9.86), plant spread (49.31 cm²), leaf area (2472.64 cm²) at 60 DAS, chlorophyll content in leaves (1.97 mg/g) at 45 DAS, number of pod per plant (59.77), pod length (9.15 cm) fresh weight of pod per plant (121.30 g), pod yield (9913 kg/ha) and number of seed per pod (9.15) over control in cluster bean crop.

Keyword : cluster bean crop, pod per plant, pod yield

INTRODUCTION

Vegetable Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] commonly known by its vernacular name “Guar” is an important leguminous (fabaceae) crop of *kharif* season in arid and semi-arid regions of India. The center of origin is the tropical Africa (Gillete *et al.*, 1958). It is a drought sufferance leguminous crop because of tap rooting system and has high capacity to recover from water stress. The root "Guar" **represents** its originated from **sanskrit** word "Gauaahar" which mean cow fodder of the livestock. The crop live best even at moderate level of salinity and **alkinity**. It improve the **the** soil fertility by fixing the atmospheric nitrogen 45 kg N /ha /year (Singh and Usha *et al.*, 2003).

The crop is largely grown during rainy season, but it can also be grow well during summer season under irrigated condition. The main purpose of gaur grown for green fodder, vegetable, seed and green manuring. Vegetable cluster bean has emerged as an Industrial crop because of the presence of (galactomannan) guar gum in endosperm, which account about 30-35 per cent of seed weight. The most common property of **guargum** is its capability to hydrate rapidly in cold water to attain a very high viscosity. Guar gum has mainly used in textile,

cosmetic, papers, pharmaceutical, purification of potash, photography and food industries. oil, petroleum, explosives,

Maximum vegetable guar is being used as culinary purpose, paper, fresh as well as in different preparations. For food industries, it is mostly used to thicken and stabilize ice-cream, salad dressings, lollipops, bakery products and confectionery items. Guar seed meal, a by product of guar gum industry, forms thickened animals feed of huge value as it contains more than 42 percent protein against 31 per cent in guar seed. It contain vitamin-'C', vitamin-'A' and vitamin-'K' dietary fiber, folate iron and potassium. **Its plant, seed and straw are rich source of nutritive fodder and feed for livestock** (Biel and Jaroszewask, 2017).

It is generally cultivated in of urban, rural areas and also in kitchen gardens. India is the world largest producer of guar, contributing about 80 per cent of world production. The cultivated area under beans in **india** during 2018-19 was 229 lakh ha with the production of 2324 MT (Anonymous, 2019). In Rajasthan, clusterbean is commonly grow in Barmer, Churu, Sriganganagar, Nagaur, Jalore, Sikar, Jaisalmer, Bikaner, Jaipur and Alwar disticts. Rajasthan occupies first position in India both in area and production. It accounts nearly 82.1 per cent area and 70 per cent production in India. Rajasthan has an area of 30.33 lakh hectare, with production of 17.16 metric tonnes with a productivity of 566 kg/ha (Anonymous, 2019-20).

MATERIALS AND METHODS

The experiment was laid out at Horticulture Farm, S.K.N. Collage of Agriculture, Jobner, during *Kharif* season 2020-21. The experiment comprised of four doses of FYM (control, 10:15:20 t FYM /ha) and four treatments of Thiourea (control, Thiourea @ 500:750:1000 ppm) and thereby making 16 treatment combinations in randomized block design with three replications. The thiourea treatments were applied at 30 and 45 DAT and FYM at soil application (after bed preparation). A uniform dose of P_2O_5 @ 500 kg/ha through SSP, K_2O @ 100 kg /ha through MOP and

Nitrogen @ 217 kg/ha through Urea were also applied at the time of field preparation. Cluster bean are planted at plot size 2.4 m x 2 m and spacing 60 cm x 20 cm were kept. Data were collected on growth attributes Plant height, Number of branches, plant spread, leaf area, chlorophyll content and yield attributes like number of pod per plant, pod length, fresh weight of pod per plant, pod yield per hectare and number of seed per pod. Five randomly selected plants were taken from each plot for observations at the time of growth and harvesting of crop.

RESULT AND DISCUSSION

The results indicated that different doses of FYM and thiourea significantly affected the plant height, number of leaves, plant spread, leaf area, chlorophyll content as well as yield attributes like number of pod per plant, pod length, fresh weight of pod per plant, pod yield per hectare and number of seed per pod (Table 4.1 and 4.2). In different doses of FYM application of FYM @ 20 t/ha significantly increased the plant height (136.82 cm 60 DAS), number of branches (9.86), plant spread (49.31 cm^2), leaf area (2472.64 cm^2) at 60 DAS, chlorophyll content in leaves (1.97 mg/g) at 45 DAS, **number of pod per plant** (59.77), pod length (9.15 cm)fresh weight of pod per plant (121.30 g), pod yield (9913 kg/ha) and **number of seed per pod (9.15)** over control and FYM @ 10 t/ha, **but statistically at par to FYM @ 15 t/ha**. These findings clearly indicated that different doses of FYM played a significant role for enhancing the growth and yield of cluster bean. The increase in these attribute might be on account of overall improvement in the vegetative growth of the plant due to application of farm yard manure, which favourably induce flowering. Fruiting and ultimately resulted in increase in the **number of cluster per plant and pod per cluster**. Farm yard manure also produce **phyto-hormones** and growth promoting substances that might increase plant growth and ultimately resulting higher yield, Pandya and Bhatt (2007). Similarly, the application thiourea @ 1000 ppm also had significant effect on plant height (132.81 cm 60 DAS), number of branches

(9.53), plant spread (48.05 cm²), leaf area (2435.43 cm²) at 60 DAS, chlorophyll content in leaves (1.90 mg/g at 45 DAS, **number of pod per plant** (57.73), pod length (8.79 cm), fresh weight of pod per plant (122.22 g), pod yield (9549 kg/ha) and number of seed per pod (8.79). However thiourea @ 1000 ppm was **found statistically at par with 750 ppm thiourea** to each other in all these growth and yield parameters. **The significant variation in growth characters and yield obtained with thiourea application was most possible due to enhance photo synthesis favoured by both improved source to sink relationship and photo synthesis effect.** The bio regulatory effect of thiourea, mostly through translocation of **photo synthates** to sink and mobilization of dry matter which ultimately improved the yield, Kumar and Kaushik (2013).

Interactive effect

The interactive influence of treatments showed that increase in level of FYM and foliar

spray of thiourea resulted in maximum fresh weight of **pod per plant** and **pod yield** of cluster bean under treatment combination S₄T₄ (FYM @ 20 t/ha along with thiourea @ 1000 ppm). The increase in yield have been reported to be associated with the release of macro and micro nutrients. **The beneficial response of FYM and thiourea on pod yield of cluster bean might also be attributed to availability of sufficient amount of plant nutrients in balanced form throughout the growth period and especially at critical growth periods of crop resulting in better uptake, plant vigour and superior yield attributes.**

Table:1**Effect of FYM and Thiourea on growth attributing characters of vegetable clusterbean**

Treatment	Plant height (cm)	Number of branches per plant	Plant spread (cm ²)	Leaf area (cm ²)	Chlorophyll content (mg/g)
FYM					
Control (S ₁)	110.54	8.21	41.19	2142.14	1.60
FYM @ 10 t/ha (S ₂)	120.64	8.82	44.17	2264.84	1.75
FYM @ 15 t/ha (S ₃)	129.96	9.39	46.85	2376.14	1.89
FYM @ 20 t/ha (S ₄)	136.82	9.86	49.31	2472.64	1.97
Thiourea					
Control (T ₁)	111.19	8.39	41.71	2147.27	1.66
Thiourea @ 500 ppm (T ₂)	123.03	8.92	44.62	2284.08	1.77
Thiourea @ 750 ppm (T ₃)	130.93	9.44	47.13	2386.98	1.87
Thiourea @ 1000 ppm (T ₄)	132.81	9.53	48.05	2435.43	1.90
SEm±	2.60	0.17	0.86	33.43	0.03
CD	7.50	0.50	2.49	96.53	0.09

Table :2 **Effect of FYM and thiourea on yield and yield attributing characters of vegetable clusterbean**

Treatment	Number of pod per plant	Pod length (cm)	Fresh weight of pod per plant (g)	Pod yield (q/ha)	Number of pod per pod
FYM					
Control (S ₁)	48.55	5.92	96.23	6399	6.02
FYM @ 10 t/ha (S ₂)	52.54	7.39	107.59	8091	7.29
FYM @ 15 t/ha (S ₃)	56.27	8.55	116.06	9462	8.55
FYM @ 20 t/ha (S ₄)	59.77	9.15	121.30	9913	9.15
Thiourea					
Control (T ₁)	49.05	6.23	95.19	7117	6.27
Thiourea @ 500 ppm (T ₂)	53.31	7.52	106.80	8086	7.52
Thiourea @ 750 ppm (T ₃)	57.05	8.46	116.96	9114	8.43
Thiourea @ 1000 ppm (T ₄)	57.73	8.79	122.22	9549	8.79
SEm±	1.24	0.22	1.86	1.61	0.22
CD	3.58	0.62	5.36	4.64	0.62

Table: 3 Interactive effect of FYM and thiourea on fresh weight of pod per plant of vegetable clusterbean

Treatments	S ₁	S ₂	S ₃	S ₄
T ₁	74.62	96.08	98.85	111.21
T ₂	86.68	107.01	113.90	119.61
T ₃	111.03	112.97	120.61	123.24
T ₄	112.58	114.31	130.88	131.12
SEm _±	3.71			
CD (P=0.05)	10.72			

Table: 4 Interactive effect of FYM and thiourea on pod yield of vegetable clusterbean

Treatments	S ₁	S ₂	S ₃	S ₄
T ₁	4146	6811	8464	9047
T ₂	5885	7618	9328	9511
T ₃	7503	8884	9732	1033.5
T ₄	8060	9050	1032.5	1075.9
SEm _±	3.21			
CD (P=0.05)	9.28			

Conclusion

Combined application of FYM @ 20 t/ha along with foliar spray of thiourea @ 1000 ppm was found significantly better in terms of plant height (136.82 cm 60 DAS), number of branches (9.86), plant spread (49.31 cm²), leaf area (2472.64 cm²) at 60 DAS, chlorophyll content in leaves (1.97 mg/g) at 45 DAS, number of pod per plant (59.77), pod length (9.15 cm), fresh weight of pod per plant (121.30 g), pod yield (9913 kg/ha) and number of seed per pod (9.15), respectively over rest of the treatment combinations except that of S₃T₃ (FYM @ 15 t/ha along with foliar spray of thiourea @ 750 ppm) which was found statistically at par to it. Thus, application of FYM @ 20

t/ha and foliar spray of thiourea @ 1000 ppm (S₄T₄) to cluster bean is recommended for high pod yield in cluster bean growing areas of semi arid and arid reasons of Rajasthan.

REFERENCES

Anonymous, (2019). Indian Horticulture Database, National Horticulture Board, Gurugram.

Anonymous, 2019-20. Commissionerate of Agriculture, Rajasthan Krishi Pant Bhawan, Jaipur pp. 1-2.

Biel, W. and Jaroszewska, A. 2017. Evaluation of chemical composition of clustre bean (*Cyamopsis tetra-gonoloba* L.) meal as an alternative to soybean meal. *Animal Nutrition and Feed Technology*, 17: 457-467.

Gillete, S.T. (1958). Indigotera in tropical Africa with releted genera *Cyamopsis* and *Rynco tropis*. Kew bull. Addition Ser., 1: 1-66.

Kumar, V. and Kaushik, V.K. 2013. Growth substances reponse to cluster bean [*Cyamopsis tetra-gonoloba* (L.)] growth parameters. *Agriculture Journal for Sustainable Development*, 2(1):11 -13.

Pandya, C.B. and Bhatt, V.R. 2007. Effect of different nutrient levels on yield and nutrient content of fodder cowpea. *Legume Research*, 30(3): 218-220.

Singh, B. and Usha, K. 2003. Nodulation and symbiotic nitrogen fixation of cowpea genotype as affected by fertilizer nitrogen. *Journal of Plant Nutrition*, 26(2): 463-473.